WHAT IS CLAIMED IS:

1. An irrigation controller for controlling the operation of an irrigation system having valves and sensors, said controller comprising:

a controller housing having a front cover door and a rear cabinet portion;

a base unit mounted within said housing and including a control panel removably mounted to the rear cabinet portion and a back plane circuit board permanently mounted to the rear cabinet portion and releasably connected with said control panel, said back plane circuit board including a plurality of discrete electrical output connector sets communicating with said first microcontroller, said removable control panel including a first microcontroller for sending control signals to said back plane circuit and capable of receiving and storing irrigation system programs input into said first microcontroller;

a base module removably mounted within said rear cabinet portion and electrically coupled with said back plane circuit board through one of said plurality of output discrete electrical output connector sets, said base module including drivers and output switches for actuating irrigation valves in accordance with control signals received from said first microcontroller; and

an expansion module removably mounted within said rear cabinet portion and electrically coupled with said back plane circuit board through another of said plurality of discrete electrical output connector sets, said expansion module including a second microcontroller capable of communicating with said first microcontroller, and drivers and output switches coupled with said second microcontroller for actuating irrigation system valves, said first and second microcontrollers operating together in order to carry out irrigation system operations not capable of being performed by said first microcontroller alone.

2. An irrigation controller as set forth in Claim 1 wherein the controller includes a plurality of said expansion modules removably mounted within said rear cabinet portion, each of said modules including said second microcontroller for operating with said first microcontroller.

3. An irrigation controller as set forth in Claim 1 including a smart module removably mounted within said rear housing portion and electrically coupled with said back plane circuit board through a third one of said plurality of output discrete electrical output connector sets, said smart module having a third microcontroller capable of communicating with said first microcontroller and operating together with said first microcontroller to control the operation of a variety of irrigation functions contained in the first microcontroller program that can not be performed by said base module and said expansion module.

4. An irrigation controller as set forth in Claim 1 wherein said control panel includes operational controls and indicators for permitting a user to input irrigation program information into said first microcontroller; and

a battery coupled with said first microcontroller to provide electrical power to said first microcontroller when said control panel is removed from said housing, whereby said control panel can be completely removed from said housing and taken to a remote location for inputting and storing irrigation program information into said microcontroller through said operational controls.

5. An irrigation controller as set forth in Claim 4 wherein said control panel includes a recess for removably receiving said battery, said battery being

retained in said recess by a cantilever-type spring mounted to the control panel and releasably biasing against said battery.

6. An irrigation controller as set forth in Claim 5 wherein said front cover door is pivotally connected to said rear cabinet portion such that when said door is closed, said door encloses said cabinet portion but can be opened to gain access to the cabinet interior, said door including a light pipe through which a visual identification of the controller status can be observed when said door is in the closed position.

7. An irrigation controller as set forth in Claim 2 wherein each of said plurality of expansion modules has a pin-out electrical connection pattern with said back plane circuit board comprising: 1- EARTH GROUND; 2- AC COM; 3- AC HOT; and 4 – COMM "X" where "X" is the particular one of said plurality of back plane circuit board connector pin sets to which the particular expansion module is coupled.

8. A modular irrigation controller for controlling the operation of an irrigation system having valves, sensors, and the like, said controller comprising:

a controller protective housing;

a base unit mounted within said housing and including a control panel removably mounted to the housing and a back plane circuit board permanently mounted in the housing, said control panel including a releasable connection to said back plane circuit board and including a first microprocessor for sending control signals to said back plane circuit;

a base module removably mounted within said housing and electrically coupled with said back plane circuit board, said base module including drivers and output switches for actuating irrigation valves in accordance with control signals received from said first microcontroller; and

at least one expansion module removably mounted within said housing and electrically coupled with said back plane circuit board, said expansion module including a second microcontroller capable of communicating with said first microcontroller, and a plurality of drivers and output switches coupled with said second microcontroller for actuating irrigation system valves, said first and second microcontrollers operating together to control the operation of an irrigation system.

9. An irrigation controller as set forth in Claim 8 wherein said back plane circuit board includes a plurality of discrete output connector sets for transmitting signals from said first microcontroller, said base module being removably connected to a first one of said plurality of back plane circuit board output connector sets, and having drivers and output switches for actuating irrigation valves in accordance with control signals received from said first microcontroller.

10. An irrigation controller as set forth in Claim 9 wherein each of said expansion modules is removably connected with another of said plurality of discrete output connector sets other than said first one, and has a pin-out electrical connection pattern with said back plane circuit board comprising: 1- EARTH GROUND; 2- AC COM; 3- AC HOT; and 4 – COMM "X" where "X" is the particular one of the plurality of output connector sets to which the particular expansion module is coupled.

11. An irrigation controller as set forth in Claim 8 including a smart module removably mounted within said housing and having a third microcontroller capable of communicating with said first microcontroller and operating together with said first microcontroller to independently control the operation of a variety of irrigation functions contained in the first microcontroller program that can not be performed by said base module and said expansion module.

12. An irrigation controller as set forth in Claim 11 wherein said back plane circuit board includes a plurality of discrete output connector sets for transmitting signals from said first microcontroller, said base module being removably connected to a first one of said plurality of back plane circuit board output connector sets, and having drivers and output switches for actuating irrigation valves in accordance with control signals received from said first microcontroller.

13. An irrigation controller as set forth in Claim 12 wherein each of said expansion modules is removably connected with another of said plurality of discrete output connector sets other than said first one, and has a pin-out electrical connection pattern with said back plane circuit board comprising: 1- EARTH GROUND; 2- AC COM; 3- AC HOT; and 4 – COMM "X" where "X" is the particular one of the plurality of output connector sets to which the particular expansion module is coupled.

14. An irrigation controller as set forth in Claim 13 wherein said smart module is removably connected with still another of said plurality of discrete output

connector sets other than said first and said another of said sets to which an expansion module is connected, and said smart module has a pin-out electrical connection pattern comprising: 1 - EARTH GROUND; 2 - AC COM; 3 - AC HOT; and 4 - COMM X; and 5 - COMM 4.

15. An irrigation controller as set forth in Claim 8 wherein said control panel includes operational controls and indicators for permitting a user to input irrigation program information into said first microcontroller; and

a battery coupled with said first microcontroller to provide electrical power to said first microcontroller when said control panel is removed from said housing, whereby said control panel can be completely removed from said housing and taken to a remote location for inputting and storing irrigation program information into said microcontroller through said operational controls.

16. An expandable modular irrigation controller for controlling the operation of an irrigation system having valves, sensors and the like, said controller comprising:

a controller protective housing having a rear cabinet portion and a front cover door, which together define an enclosed interior space, said cover door being openable to permit access to the interior space;

a base controller unit mounted within said enclosed interior space and including a control panel removably mounted to the rear cabinet portion and a back plane circuit board permanently mounted to the rear cabinet portion; said control panel including:

a releasable electrical connection with said back plane circuit board;

a first microprocessor for receiving and storing irrigation program information and sending control signals to said back plane circuit through said releasable electrical connection;

operational controls and indicators for permitting a user to input irrigation program information into said first microcontroller; and

a battery coupled with said first microcontroller to provide electrical power to said first microcontroller when said control panel is removed from said housing, whereby said control panel can be completely removed from said housing and taken to a remote location for inputting and storing irrigation program information into said microcontroller through said operational controls;

a base module removably mounted within said rear cabinet portion and electrically coupled with said back plane circuit board, said base module including a plurality of drivers and output switches for actuating irrigation valves in accordance with control signals received from said first microcontroller; and

a plurality of expansion modules removably mounted within said rear cabinet portion and electrically coupled with said back plane circuit board, each of said expansion modules including a second microcontroller capable of communicating with said first microcontroller, and drivers and output switches coupled with said second microcontroller for actuating irrigation system valves, said first and second microcontrollers operating together in order to carry out irrigation system operations not capable of being performed by said first microcontroller alone.

17. An expandable modular irrigation controller as set forth in Claim 16 wherein said back plane circuit board includes a plurality of module receiving bays each having a discrete output connector set for communicating between said first microcontroller and a module connected thereto;

said base module being removably connected to a first one of said plurality of module receiving bays; and

each of said plurality of expansion modules being connectable with each of the plurality of module receiving bays other than said first one.

18. An expandable modular irrigation controller as set forth in Claim 17 wherein each of said expansion modules has a pin-out electrical connection pattern with said discrete output connector set of said back plane circuit board comprising: 1- EARTH GROUND; 2- AC COM; 3- AC HOT; and 4 – COMM "X" where "X" is the particular one of plurality of module receiving bays into which the particular expansion module is positioned.

19. An expandable modular irrigation controller as set forth in Claim 18 including a smart module removably mounted within said housing and having a third microcontroller capable of communicating with said first microcontroller and operating together with said first microcontroller to independently control the operation of a variety of irrigation functions contained in the first microcontroller program that can not be performed by said base module and said expansion modules.

20. A modular irrigation controller as set forth in Claim 19 wherein said smart module is removably connectable with another of said plurality of module receiving bays other than said first one, said smart module having a pin-out electrical connection pattern comprising: 1- EARTH GROUND; 2 - AC COM; 3 - AC HOT; and 4 - COMM X; and 5 - COMM 4.

21. An irrigation controller for controlling the operation of an irrigation system having valves, sensors, and the like, said controller comprising:

a controller protective housing within which is mounted a base unit and a base module;

said base unit including a control panel removably mounted to the housing and a back plane circuit board permanently mounted in the housing, said control panel being electrically coupled with said back plane circuit board by a releasable connector, and including a first microprocessor for sending control signals to said back plane circuit through said releasable connector;

said back plane circuit board including a plurality of discrete output connector sets for transmitting signals from said first microcontroller;

said base module being removably connected to a first one of said plurality of back plane circuit board output connector sets, and having drivers and output switches for actuating irrigation valves in accordance with control signals received from said first microcontroller; and

a battery coupled with said first microcontroller to provide electrical power to said first microcontroller when said control panel is removed from said housing,

whereby said control panel can be completely removed from said housing and taken to a remote location for inputting and storing irrigation program information into said microcontroller.

22. An irrigation controller as set forth in Claim 21 wherein said control panel includes a recess for removably receiving said battery, said battery being retained in said recess by a cantilever-type spring mounted to the control panel and releasably biasing against said battery.

23. An irrigation controller as set forth in Claim 21 wherein said protective housing includes a door and a rear cabinet portion, said door being pivotally connected to said rear cabinet portion such that when said door is closed, said door encloses said cabinet portion but can by opened to gain access to the cabinet interior, said door including a light pipe through which a visual indication of the controller status can be observed when said door is in the closed position.

24. An irrigation controller as set forth in Claim 21 including:

at least one expansion module removably mounted in said housing and having electrical connector sets for electrically coupling said expansion module with another of said plurality of back plane circuit board output connector pin sets, and having output connectors for connection to the irrigation valves, sensors and the like;

said expansion module including a second microcontroller capable of communicating with said first microcontroller, and a plurality of drivers and output switches coupled with said second microcontroller for actuating irrigation system

valves, said first and second microcontrollers operating together to control the operation of an irrigation system.

25. An expandable modular irrigation controller as set forth in Claim 24 wherein the pin-out pattern of the connection between the electrical connector set of said expansion module and said another of said back plane circuit board connector sets comprises: 1- EARTH GROUND; 2- AC COM; 3- AC HOT; and 4 – COMM "X" where "X" is the particular one of the plurality of back plane circuit board connector sets to which the particular expansion module is coupled.

26. An expandable modular irrigation controller as set forth in Claim 25 further including:

A smart module removably mounted in said housing and having electrical connector sets for electrically coupling said smart module with a third of said plurality of back plane circuit board output connector sets, said smart module including a third microcontroller capable of communicating with said first microcontroller and operating together with said first microcontroller to control the operation of a variety of irrigation functions contained in the first microcontroller program that can not be performed by said base module and said expansion modules.

27. An expandable modular irrigation controller as set forth in Claim 26 wherein the pin-out pattern of the connection between the electrical connector set of said smart module and said third of said back plane circuit board connector sets

comprises: 1 - EARTH GROUND; 2 - AC COM; 3 - AC HOT; and 4 - COMM X; and 5 – COMM 4.

28. An expandable modular irrigation controller for controlling the operation of an irrigation system having valves, sensors, and the like, said controller comprising:

a controller protective housing within which is mounted a base unit, a base module, and at least one expansion module;

said base unit including a control panel mounted to the housing and a back plane circuit board permanently mounted in the housing, said control panel including a first microprocessor for sending control signals to said back plane circuit;

said back plane circuit board including a plurality of discrete output connector pin sets for receiving signals from said first microcontroller and transmitting the received signals to modules contained within the housing;

said base module being connected to a first one of said back plane circuit board output connector pin sets, and having drivers and output switches for actuating irrigation valves in accordance with control signals received from said first microcontroller;

said at least one expansion modules having electrical connector sets for electrically coupling said expansion module with a second of said back plane circuit board output connector pin sets, and having output connectors for connection to the irrigation valves, sensors and the like;

said expansion module including a second microcontroller capable of communicating with said first microcontroller, and a plurality of drivers and output

switches coupled with said second microcontroller for actuating irrigation system valves, said first and second microcontrollers operating together to carry out irrigation system operations not capable of being performed by said first microcontroller alone; and

a smart module electrically connected to a third of said back plane circuit board output connector pin sets, said smart module including a third microcontroller capable of communicating with said first microcontroller and operating together with said first microcontroller to control the operation of a variety of irrigation functions contained in the first microcontroller program that can not be performed by said base module and said expansion modules.

29. An expandable modular irrigation controller as set forth in Claim 28 wherein the pin-out pattern of the connection between the electrical connector set of said expansion module and said second of said back plane circuit board connector sets comprises: 1- EARTH GROUND; 2- AC COM; 3- AC HOT; and 4 – COMM "X" where "X" is the particular one of the plurality of back plane circuit board connector sets other than said first one, to which the particular expansion module is coupled.

30. An expandable modular irrigation controller as set forth in Claim 29 further including a smart module removably mounted in said housing and having electrical connector sets for electrically coupling said smart module with a third of said plurality of back plane circuit board output connector sets, said smart module including a third microcontroller capable of communicating with said first microcontroller and operating together with said first microcontroller to control the

operation of a variety of irrigation functions contained in the first microcontroller program that can not be performed by said base module and said expansion modules.

31. An expandable modular irrigation controller as set forth in Claim 30 wherein the pin-out pattern of the connection between the electrical connector set of said smart module and said third of said back plane circuit board connector sets comprises: 1 - EARTH GROUND; 2 - AC COM; 3 - AC HOT; and 4 – COMM X; and 5 - COMM 4.

32. In an irrigation controller of the type including a central controller unit housed within a protective housing and having a programmable base microcontroller within the housing for receiving and storing irrigation program schedules, and at least one expansion module assembly removably mounted within the housing and coupled with the base microcontroller and with a plurality of remote irrigation function operators such as valves, sensors, and the like, the improvement wherein said at least one module assembly includes a second internal microcontroller communicating with said base microcontroller and operable therewith to effect execution of irrigation program functions not capable of being executed by said base microcontroller alone.

33. The improvement as defined in Claim 32 wherein said expansion module assembly includes a generally rectangular shaped body having front and rear ends separated by top and bottom surfaces, said front end portion carrying a set of exposed electrical connectors, and said rear end portion having output

connection terminals thereon for connection to external irrigation system valves, sensors and the like, and releasable means carried by said body for coupling and retaining said module in an operative position within said protective housing with said electrical connectors on said front end portion electrically coupled to said base microcontroller.

34. The improvement as set forth in Claim 33 wherein said base microcontroller is coupled to a back plane circuit board mounted in said protective housing, said back plane circuit board having a plurality of discrete output connector sets for transmitting signals from said first microcontroller to said set of exposed electrical connectors of said expansion module when said module is in said operative position.

35. The improvement as set forth in Claim 34 wherein said means for coupling and retaining said said expansion module in said operative position comprises a lever pivotally mounted to the top surface of said body, said lever having a locking tab that can be moved by pivoting said lever into and out of abutting engagement with a shoulder formed on a portion of said housing.